Occupational Safety and Health Policy:Kubicki:3-4794

IMPLEMENTATION OF NFPA STANDARD 25

Distribution

The purpose of this memorandum is to provide guidance on the implementaion of National Fire Protection Association (NFPA) Standard 25, "Standard for the Inspection, Testing, and Maintenance of Water Based Fire Protection Systems." This Standard has been in effect since it's promulgation in 1992 and has been applicable to the Department of Energy (DOE) through the requirements delineated in DOE 5480.7A, "Fire Protection" and DOE O 420.1, "Facility Safety."

The subject guidelines, which are included as Attachment 1, were developed by the DOE Fire Safety Committee based on requests for assistance from both DOE and Contractor fire protection representatives and maintenance organizations. This guidance was perceived to be needed to reduce unnecessary costs associated with inspection, testing and maintenance of fire protection systems and to facilitate the application of the Standard to the unique circumstances which characterize the Department.

Neither this memorandum nor the attached guidelines impose new requirements on the Department or it's contractors. In fact, the guidance in many instances reflects a relaxation of existing requirements from those delineated in the NFPA Standard. To the extent that this was done, the DOE Fire Safety Committee considered the implications and concluded that implementation of the revised criteria would maintain an acceptable level of safety.

Nothing in these guidelines prevents the development of alternate approaches that will achieve a comparable level of fire protection. These approaches can be implemented based on an "Equivalency" determination as defined by DOE 5480.7A and DOE O 420.1.

If you have any questions, please contact me on 301-903-4794 (dennis.kubicki@eh.doe.gov).

Dennis Kubicki, P.E. Chairman
DOE Fire Safety Committee

Attachment

IMPLEMENTATION GUIDANCE

NATIONAL FIRE PROTECTION ASSOCIATION STANDARD 25

"Inpection, Testing and Maintenance of Water-Based Fire Protection Systems"

December, 1998

Introduction and Background

The Department of Energy (DOE), through administrative action, complies with the National Fire Protection Association (NFPA) standards, including NFPA 25 on Inspection, Testing, and Maintenance of Water-Based Fire Suppression Systems. The NFPA originally issued its Standard 25 on February 10, 1992. (The 1998 Edition is currently in force.) This document gathered all the inspection, testing, and maintenance requirements for these systems into one standard; previously they were contained in the various design standards for water-based fire suppression systems. The frequencies of many maintenance requirements were increased in the new NFPA 25, and there were many required procedures added.

Prior to the development of and unrelated to NFPA 25, the DOE Richland Operations Office decided to study its maintenance and fire protection system failure rate data to see if there was justification to reduce its costs by not conforming with the NFPA frequencies. A committee of fire protection professionals there found such justification for the Hanford Site, and decided to request that frequencies be reduced for maintenance of 14 specific fire protection systems. They submitted an exemption request to the DOE Office of Environmental Management, which ultimately approved and forwarded it to the DOE Office of Environment, Safety, and Health (EH). The request was subsequently approved.

The DOE Fire Safety Committee, aware of Richland's action, decided to form some subcommittees at its December 1992 meeting to study some specific problems. One of these was a Programmatic Issues Subcommittee, which was first tasked with developing DOE-wide guidance on implementing NFPA 25, based on the Richland exemption request and a Draft Hanford Site Compliance with NFPA 25 Plan. This is the report of that Subcommittee's work.

A request for a determination of equivalency to NFPA 25 was also submitted by Martin Marietta Energy Systems, Inc. (MMES) to the DOE Oak Ridge Operations Office and to the Office of Environment, Safety, and Health. That request was approved, contingent upon MMES conforming with the recommendations of the Programmatic Issues Subcommittee. The Subcommittee examined the MMES proposal in detail, including many instances where differing maintenance frequencies that had been previously recommended existed, and determined appropriate frequencies for maintenance of fire protection systems.

There is a general lack of available data on how previous and existing fire suppression system maintenance requirements were established. Several literature searches and discussions with technical experts in this area failed to reveal definitive research in this area. Failure rate data were obtained from several DOE sites, and some comparisons were made on the effects of changing testing frequencies in particular to see what failure rates would subsequently result. For the case where this was done the failure rates were actually worse at the site with the more frequent testing. In some cases, the best answers the Subcommittee was able to justify were that professional judgement and experience, as used by the NFPA committees in establishing the existing maintenance requirements, had to be used when establishing our own requirements.

General Discussion of Maintenance of Fire Protection Systems

The establishment of maintenance requirements, including the specific maintenance actions needed and the frequencies at which they must be performed, is not an exact science. The goal is to balance the amount of maintenance to maximize system life or reliability against the cost of the maintenance. Theoretically, more frequent maintenance leads to longer life and higher reliability. It also leads to increased costs. Optimization of maintenance frequency might be achieved by performing maintenance at the point where the graphs of frequency of maintenance and system reliability intersect. Some manufacturers do parametric studies of their products or systems to determine the optimum maintenance requirements, but that has not been done for fire protection systems.

Unlike many "systems," there is little "maintenance" which is done to fire suppression systems, on a routine basis, to increase their performance or prolong their useful life. There is no periodic cleaning done to enhance performance, no lubrication, no planned replacement of parts on a periodic basis, and no measurement of system performance to predict future maintenance needs. Maintenance of fire protection systems consists largely of periodic testing of components, either singly or in a full system test, to verify operation, and periodic inspection to verify system integrity. Fire protection systems are examined visually to ensure that there are no gross misconfigurations or degradation problems which would prevent performance, and that system components are operable, e.g. nozzles and sprinkler heads are not blocked.

There are exceptions. The more "exotic" systems, such as foam-water systems, require chemical testing of the foam. These systems have substantially more moving parts than most fire suppression systems that do require more of what might be considered "maintenance" than do more common fire suppression systems. Additionally, internal combustion engines which drive generators or fire pumps also have more classical maintenance requirements such as periodic replacement of lubricating oils.

The benefit from fire suppression systems maintenance as it is done now is that critical system components which have failed or are near failure are not allowed to remain in that state for long periods of time. Increasing the frequency of maintenance would lessen the time that a component was allowed to remain in a failed state without the knowledge of the systems operators. The study which was done at Hanford documented very low rates of failure of components in large populations of specific maintenance procedures performed. Hanford is continuing to take data to determine if their decreased maintenance frequencies are causing increases in failure rates.

In considering which specific frequencies to recommend for testing of certain components, the Subcommittee tended not to make extreme changes in the length of component operational testing that might significantly increase the time in which failed components remain in service, however.

Method

The Subcommittee met in a face-to-face setting at the Annual DOE/Contractor Fire Protection meeting in Augusta, Georgia, in March of 1993 and the Annual meeting in Albuquerque, New Mexico, in May, 1994. It met numerous other times by teleconference. The Subcommittee discussed each point of the proposed draft Hanford Site Compliance With NFPA 25 plan, and the then-approved Oak Ridge maintenance schedule. The issue of the validity of transferring, the Hanford or Oak Ridge recommendations generically to all DOE sites was discussed at length. Many hesitations to adopt the existing proposals were based on such questions of validity of the rationale used to justify those proposals as it would be applied to places with differing security and environmental conditions. The question of application of the Subcommittee recommendations to fire suppression systems in nuclear facilities was discussed.

Several literature searches were done. The collection of the Fire Research Information Services at the National Institute of Standards and Technology was searched for research on maintenance and fire protection systems. The DOE Headquarters' Library performed a literature search on the key words "fire protection system" and "maintenance." And the NFPA Library performed a search to try to correlate fire protection systems, maintenance, and system reliability. These efforts turned up little work done on maintenance, and essentially no work done to identify correlation between maintenance of fire protection systems and their reliability.

The Subcommittee's recommendations on maintenance frequencies are included in this report in tabular form, with justifications and footnotes included. The specific deliberations of the Subcommittee are included in its minutes, attached as an appendix to this report. Where appropriate, references are provided.

Subcommittee Philosophy

The Subcommittee used the draft Hanford Site Compliance With NFPA 25 and the Oak Ridge fire protection maintenance plan to consider changes to NFPA 25 requirements. The Hanford plan was developed by engineers at the Hanford site in consideration of their failure experience and environmental conditions. The effort put into developing the Hanford plan was very comprehensive, and the Subcommittee did not desire to duplicate it. Likewise, the Oak Ridge frequencies have been used for upwards of 20 years, with acceptable failure rates being experienced. Where there was any question that the basis for the a recommendation may not be generally applicable to DOE sites, the Subcommittee opted to stick with the NFPA 25 frequency.

Many of the maintenance frequencies were not changed, but were caveated with a note for a DOE site to make its own judgement to use the NFPA requirement or to request relief through DOE. These were left that way because of the uncertainties of external environmental influences upon structural integrity of systems and influences upon the performance of some parts, such as strainers. Engineers at DOE sites, which believe that they have justification for changing these maintenance frequencies, should examine the basis for the Hanford changes in maintenance; the

intent of the NFPA 25 standard; the specific performance requirements of their systems; and the specific environmental conditions encountered and their effects on system integrity and performance. Situations thought to justify less frequent maintenance must be referred to the DOE Operations Office through appropriate channels for consideration of an Equivalency as defined by the DOE Fire Protection Order, DOE 5480.7A and DOE O 420.1, "Facility Safety."

The Subcommittee did not attempt to rigorously define the term "failure." A failure was considered as the specific piece of equipment being inspected or tested not meeting the inspection or test criteria.

DOE Maintenance Management Order

This DOE Order currently governs the maintenance of DOE facilities. It requires that DOE contractors develop Maintenance Implementation Plans addressing certain specified elements of good maintenance programs and practices. The determination of maintenance procedures and frequencies for nuclear facilities is based on regulatory and code requirements; vendor recommendations; experience at this facility and other facilities; engineering judgement; cost/benefit analysis; available manpower; minimizing personnel radiation exposure using ALARA principles; function, ease of replacement, and demonstrated reliability of the equipment or system; optimizing the equipment or system availability during unit operating conditions; and operating history. These are the same principles that the Subcommittee used in its deliberations. The Subcommittee believes that its work is compatible with the requirements of this Order.

Nuclear Facilities

Maintenance at DOE nuclear facilities will be governed by 10 CFR 830 Part 340. The major point of this regulation is that a Maintenance and Implementation Plan (M&IP) will be required for nuclear facilities, and that plan will be approved by DOE. The M&IP will contain specifics on which systems in the nuclear facility are covered, what maintenance will be done on those systems, and when that maintenance will be done, among other things. Any deviations from NFPA 25 or other nationally recognized consensus standards for maintenance of systems in nuclear facilities will have to be listed in the Implementation Plan for this nuclear safety rule, to be approved by the Cognizant Secretarial Officer or designee. These deviations will have to be carefully scrutinized and justified. The avenue to do this is clearly through the development and approval of the M&IP.

Conclusions

The Subcommittee reminds all readers of this document that the NFPA 25 requirements are minimum requirements which should not be changed without solid technical rationale. The Subcommittee believes that the rationale used in the development of the maintenance frequencies in this document was sound. This document constitutes a fully DOE-approved equivalent means of complying with the NFPA 25 standard.

Specific Subcommittee Recommendations

The following table lists those specific maintenance, test, or inspection activities from NFPA 25 which the Subcommittee changed or thought that a DOE site might be able to justify change based on their specific environmental circumstances.

The table also identifies the specific frequencies adopted by the DOE contractors at the Hanford Site, the Oak Ridge sites, and at the Idaho National Engineering and Environmental Laboratory. This collective information is intended to provide other DOE sites with additional rationale to proceed with similar changes to their site inspection, testing and maintenance programs.

Under no circumstances is the Subcommittee suggesting that more liberal frequencies be adopted when a rational, technical analysis by a qualified fire protection engineer reveals that implementation of them would be significantly detrimental to fire safety.

The Subcommittee also strongly recommends that data on the performance of site fire protection systems under any revised program be collected for future trend analysis. Where such analysis reveals that fire safety systems are being adversely affected by the implementation of these frequencies, the program should be altered accordingly until system performance returns to acceptable parameters.

Inspection , Test, and Maintenance
Frequency Matrix

The following tables include only those inspection requirements and corresponding frequencies where a change from the NFPA 25 frequencies were deemed adviseable or where retaining such frequencies warranted some comment. The frequencies delineated in NFPA 25 should be followed for Catagory I nuclear facilities or facilities deemed significant by the DOE Authority Having Jurisdiction on the basis of risk to the public, site workers, DOE programs or property.

December, 1998

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Sprinkler Head Inspection P 2-2.1.1, T 2-1	Annually	Same as facility, not to exceed 3 years	Annually	2 Years	Same as facility assessment, not to exceed 3 years	(RL) Annually replace for commercial cooking equipment and for ventilation systems, greater than 50years.
Spare Sprinkler Head Inspection P 2-2.1.3, T 2-1	Annually	Annually	N/A, centralized storage	N/A centralized storage	Annually	Applicable also where central inventory is maintained.
Alarm Device Inspections P 2-2.6,T 2-1	Quarterly	Quarterly	Annually	Annually	Quarterly	This is a critical fire protection functional test
Hose Cabinet Inspections T 3-1	Annually	Same as the facility, not to exceed 3 years	Annually for those expected to be used, 5 years after purchase, then every 3 years	Annually	Same as the facility assessment, not to exceed 3 years	Eliminate installed fire hose, only provide a hose valve with 2-1/2 to 1-1/2 adaptor
Hydraulic inspection of nameplate on Sprinkler Systems P 2-2.7	Quarterly	Same as facility, not to exceed 3 years	Every 5 years	Every 2 years	Same as facility assessment, not to exceed 3 years	Inspection limited to verifying that the data is present and comparing the static pressure to the supply side ACV gauge.

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Test of water flow alarms P 2-3.3	Quarterly	Semi-Annually	Quarterly	Every 4 months, High Hazard Every 2 Months	Quarterly	This is a critical FP functional test.
Test of sprinkler system gauges P 2-3.2, P2-2.4.1, P 2-2.4.2, P 2.4.2, T 2-1	Every 5 years	When abnormal	Weekly on pumps. Annually on tanks.	Every 5 years. High hazard, dry pipe, preaction and deluge w/o air supervision-weekly inspection	Every 5 years	Combine with other riser inspections and tests
Sprinkler System Piping and Fittings Inspection P 2-2.2	Annually	Same as facility assessment, not to exceed 3 years	Annually	Every 2 years. At 10 years for internal condition of piping where conditions of obstruction	Same as facility assessment, not to exceed 3 years	Combine with sprinkler head inspection
Water Motor Gong Test P 2-3.3	Quarterly	Semi-annually	Quarterly	Every 4 months, high hazard-quarterly	Quarterly	Delete (covered under alarm devices)
Compressor Maintenance P 2-4.2.2	Per manufacture	Annually	Per manufacturer	Per manufacturer, annually	Annually	Air supply should be inspected to confirm serviceability weekly, quarterly if supervised.
Alarm Devices Test T 3-1	Quarterly	Semi-annually	Annually	Annually, w/o supervision, every 2 months	Quarterly	

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Hose Nozzles Inspection P 3-1, T 3-1	Annually	None	Annually	Annually	Annually	Include in extinguisher inspection
Hose Nozzles Test T 3-1	Annually	When abnormal	When abnormal	Annual, visual inspect only	When abnormal	Eliminate installed fire hose; provide a hose valve with 2-1/2 to 1-1/2 adaptor
Hose Storage Rack Inspection T3-1	Annually	Same as facility assessment, not to exceed 3 years	Annually	Annually	Same as facility assessment, not to exceed 3 years.	Eliminate installed fire hose, provide a 2-1/2 to 1-1/2 adaptor
Standpipe, Flow and Hydrostatic Test P3-3.1, T 3-1	5 Years	5 Years	5 Years	2 Years on inspection, 5 years on dry standpipe hydro test.	5 Years	
Standpipe Systems Alarm Device Test T 3-1	Quarterly	Semi-annually	N/A	N/A	Quarterly*	*More extended frequencies accepted, with justification.
Mainline Strainers, Inspection P 4-4.2	Annually	Per manufacturer or annually	Annually	Annually, (flush strainer)	Per manufacturer or annually	
Hydrant Inspection,Test & Maintenance P 4.4.3	Inspection-6 months, Test-1/year, Maintain-1/year	Annually	Annually	Annually, 5year flow test.	Annually (combine inspection, testing & maintain)	

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Underground and exposed Piping, Flow Tests P 4-3.1	Minimum 5 year intervals to determine internal condition.	Annually, different areas of facilities on 5 year cycle	Annually	5 years	5 years	The frequency should relate to the corrosivity of the local soil conditions.
Hose /Hydrant Houses , Inspection P 4-2.1	Quarterly	Annually	Annually or as specified by facility fire protection engineer	Annually	Annually	Eliminate installed fire hose, provide a 2-1/2 to 1-1/2 adaptor
Fire Pump Heating System Inspection P 5-1.1	Weekly during heating season	Weekly during heating season if temperature is monitored. Monthly if temperature is monitored.	Weekly	Weekly	Weekly during heating season if no temperature monitoring. Monthly if temperature is monitored.	
Fire Pump, Vent Louvers Inspection P 5-1.1	Weekly During heating season	Weekly or Monthly; weekly unless the pump room is constantly monitored for low temp. conditions	Weekly	Weekly	Weekly during heating season if no temperature monitoring. Monthly if temperature is monitored.	
Water Storage Tanks, Water condition/level (check for ice) P 6-2.1,T6-1.1	Daily/ Weekly during the heating season	Daily when temperature is less than freezing, unless constantly monitored.	Daily during heating season; tanks equipped with supervised low temp alarms.	Daily when temp is 40deg. or lower, level, temp and heating system	Varies by site. Daily during the heating season unless temperature is monitored	

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Mainline Strainers Inspection and maintenance P 7-3.9,T7-3.1, P 7-3.1.5	Inspect-per manufacture Maintain-every 5 years	5Years combined I&M	5 Years	Annually	5 Years (combined inspection, test and maintain)	
Valve enclosures, cold weather inspection P 7-3.1.2, P9-4.3.1, P 9-4.4.1.1, T-9-1	Daily/ Weekly if temperature is supervised.	Weekly/ Monthly if enclosure monitored by low temp. alarm device	Daily, electrically supervised low temp. alarm	Daily if no low temp. alarm during cold weather; inspect to ensure 40 deg. F can be maintained	Daily/Weekly if enclosure is monitored by low temperature alarm.	Inspect to ensure that a minimum temperature of 40 Deg F can be maintained
Pipe and Hangars Inspection, P 7-3.4.1 & P 7-3.4.2 T-7-3.1	Quarterly/or Monthly	Annually	Annually	Every 2 Years	Annually	
Tank Interior Inspection P 6-2.4/T-6-1.1	5 Years,3 years w/o corrosion protection	5 Years	5 Years	5 Years w/cathodic protection, 3years w/o cathodic protection	5 Years	
Water Storage Tanks, Heating System Inspection, P 6-2.8, T-6-1.1	Daily/ Weekly during heating season, with temp. supv.	Daily when temp. is less than 30deg F, unless monitored	Daily, tank temp. during freezing weather, equipped with low temp satisfies this inspection	Daily when temp. is 40deg F or below	Site specific. Daily during heating season unless water temperature is monitored	
Spray Nozzles Inspection P 7-3.5, T 7-3.1	Annually	Annually	Annually	Annually	Annually	These are special actuation devices

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Nozzle Strainers, Water Spray & Foam System Inspection and Maintenance, P8-2.9.1, P 7-3.1.4 P 7-3.5, T 7-3.1	Maintain annually, Inspect per manufacture	Annually	Annually	Annually	Annually or after each flow test or actuation.	
Drainage Inspection, P 7-3.10, T 8-2, P 8-2.10	Quarterly	Annually	Annually	Annually	Annually	Must observe spring growth, fall leaf drop, winter ice,etc.
Foam Water System discharge device location, position and check for obstruction, inspect T 8-2, P 7-3.5.1, P 8-2.9.2	Inspect monthly. Test annually	Annually	Anually	Annually	Annually	These are special protection devices
Foam Water Syst. concentrate strainer, inspection, Insp/Test/Maint, P 8-2.9, P8-2.9.2, T-8-2	Insp Qtrly. Test annualy. Maint-Qrtly & after each flow	Annually	Annually (Strainer)	Annually	Annually for systems using AFFF or fresh water. Monthly for other foams.	Foam concentrate is noted for corrosion and coagulation
Foam Water System, Proportioning System Inspection T 8-2, P 8-2.11, P 8-3.3, P 8-4	Inspect Monthly, Test annually, Maint. Mfr-5 years+	Annual for fixed proportioners. Monthly for adjustable proportioners	Annually	Annually	Annually for fixed proportioners. Monthly for adjustible proportioners. Monthly fluid.	These are very special devices.

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Foam Water System, Foam concentrate pump, power, inspection T 8-2, P8-4.4 (a) & (b), P 8-4.5 (a) & (b)	Monthly, operate pump; mfr Maint. @ 5yrs or less interval.	Monthly	Annually	N/A	Monthly*	*Greater frequencies acceptable with justification.
Foam Water System, Foam concentrate strainer, inspection & maintenance P 8-2.9	Annually	Annually	Annually or per mfr.	Annually	Annually for systems using AFFF or fresh water. Monthly for other foams	
System Corrosion Inspection, P 8-2.3(b), 8-4.1(c), 8-4.3 (a) T 8-2	Insp. Quarterly, Maint. 10 yrs	Annually	Annually	Annually	Annually	Corrosion must be detected and addressed promptly
Sys. Pipe/Fitting Damage Inspection , I&M T 8-2, P-8.2.3	Quarterly	Annually	Annually	Annually	Annually	Inspection for visual external inspection; same as nozzle placement and direction
Fittings Corrosion, Inspection, I&M T 8-2)	Quarterly	Annually	Anually	Annually	Annually	
Fittings damage, Inspection,T 8-2	Quarterly	Annually	Annually	Annually	Annually	
Hangars and Supports, Inspection T 8-2, P 8-2.4	Quarterly	Annually	Annually	Annually	Annually	Combine with other quarterly inspections

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Discharge Device location, position and obstruction test T 8-2	Annually	Annually	Annually	Annually	5 Years* or a frequency acceptable to meet EPA requirements	*Justified by DOE experience.
Foam Concentrate Strainers, test P 8-2.9	Annually	Annually	Annually	Annually	5 Years*	*Justified by DOE experience.
Proportioning Systems, all test P 8.2.9	Annually	Annually	Annually	Annually	5 Years*	*Justified by DOE experience.
Complete Foam Water Systems, Operational test P 8-3.3, T8-2	Annually	Annually	Annually	5 years	5 Years	Longer test interval may be acceptable for discharge inside facilities
Alarm Valves, Exterior Inspection P 9-4.1.1, T 9-1	Monthly	Monthly or Quarterly	Quarterly	Quarterly	Quarterly	
Hose Connection Inspection P 9-5.2, T 9-1	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Could extend for equpmt not accessible to unathorized personnel
Fire Department connections, inspection P 9-7.1, T 9-1	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Could extend for eqipment not accessible to unauthorized personnel.
Main Drain Test P 9-2.6, T9-1	Quarterly	Semi-annually	Quarterly	Every 4 months. 3 months for High Hazard	Quarterly	

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Dry Pipe valves, quick opening devices, test T 9-1, P 9-4.4	Semi-annually	Annually	Annually	Annually	Semi-annually*	* Annual frequency acceptable with justification.
Preaction/Deluge/ dry pipe valve, inspection of exterior P 9-4.3; T 9-1	Monthly	Quarterly	Quarterly	Quarterly	Quarterly	
Preaction/Deluge/ Dry Pipe valve enclosure, Inspect P9.4.3.1, 9.4.4.1.1	Daily/ Weekly if temp. constantly monitored	Daily at temp. less than 32 deg. F, Monthly if low temp. alarmed	Daily/ elecrical supervision satisfies, no other frequency mentioned	Daily /Monthly if low temp. alarmed.	Daily if no temperature monitoring.Monthly if temperature is monitored.	
Dry Pipe valves interior , inspection P 9-4.4.1.4, T 9-1	Annaully	Every three years at full flow test	Every three years	Every 3 years or when valve/system is altered.	Annually*	*Greater frequency acceptable with justification.
Orifices, filters,and strainers, inspection P 9-4.4.1.5, T 9-1	5 Years	5 Years	5 Years	5 Years	5 Years*	*Greater frequency acceptable with justification.
Water Flow Alarm Test P 9-2.7, T 9-1	Quarterly	Semi-annually	Quarterly	4 months= normal, 3 months high hazard+ OCT thru FEB	Quarterly*	*Greater frequency acceptable with justification.
Post Indicator valves, position test P 9-3.4.1	Quarterly	Semi-annual	Annually	4mo=normal 3 mo=high hazard	Semi-annually	

Inspection Requirement NFPA-25 Ref. P=paragraph T=Table	NFPA Frequency	Oak Ridge Frequency	Idaho Frequency	Richland Frequency	DOE Fire Safety Committee Frequency	Comments:
Dry Pipe Valves, Priming water test, P 9-4.4.2.1	Quarterly	Annually	Quarterly	4 mo =normal 3 mo= high hazzard	Semi-annually	
Dry Pipe Valves, low air pressure alarms test. P 9-4.4.2.6	Quarterly	Semi-annually	Quarterly	4 months, high hazard and Oct- Feb, every 3 months	Semi-annually	
Deluge/Preaction valves, priming water test P 9-4..3.2.1	Quarterly	Annually	Quarterly	4 months	Semi-annually	
Full Trip Test- Preaction/ Deluge Firecycle, P 9-4.3.2.2	Annually	Annually	Every Three Years	Trip test annually, Full test every 3 years.	Annually	
Dry Pipe Valve Full Flow Trip Test P 9-4.4.2.2.1	3 Years	3 Years	3 Years	Trip test annually, full test every 3 years	3 Years	

APPENDIX

Much discussion ensued on the issue of testing of waterflow alarm devices. The Subcommittee initially recommended a four month frequency, but Oak Ridge has been doing this activity for 25 years at a six month frequency. The available data were reviewed. At Hanford, the four month frequency has resulted in 8 failures of pressure type devi ces in 2,781 tests (0.29%) over 3 years and 4 failures in 1,953 tests (0.2%) of paddle type devices over three years. Oak Ridge has found 14 fail.ures in 2,766 tests (0.5%) over 3 years at the six month frequency. Additional data received after the telecon, on testing at Portsmouth, indicates 9 failures in 902 tests (1.0%) in a seven month period.

Test Freguency	Failure rates	# Tests	# Failures
4 months	**0.29%**	**2781**	**8**
4 months	**0.2%**	**1953**	**4**
6 months	**0.5%**	**2766**	**14**
6 months	**1.0%**	**902**	**9**

A factor which must be considered is that these are not predictive tests; they are only functional tests which indicate pass or fail. If an alarm device fails the day after it is tested, it will remain in a failed state, without the contractor having knowledge of its failed state, until the next test. The frequency of the functional test of the device is a measure of how long one is willing to tolerate not knowing that an alarm device has failed.

If we look at the problem from the number of failures in a given time period, we have the following data:

Hanford: **0.22** failures/month, **.88** failures in 4 months **(avg.)**
0.11 failures/month, **.44** failures in **4** months **(avg.)**

Oak Ridge: **0.39** failures/month, **2 -34** failures in **6** months **(avg.)**

Portsmouth: **1.3** failures/month, **7.8** failures in **6** months **(avg.)**

These alarm devices fail not because we do not test them frequently enough - they fail because of corrosion, material aging, defective materials initially, build up of deposits from their watery environment, improper adjustment, and other factors in their immediate environment, all of which

are completely independent of the testing frequency. If Oak Ridge were to increase their test frequency to 4 months, the following would result, based on their average of .39 failures per month:

Annual result: **4** to **5** failures in **1,383** tests, for **a** failure rate of **0.36%**

Hanford did 1,953 tests and experienced a failure rate of 0.2%, which is 44% less than what Oak Ridge would experience even at the same testing frequency. Oak Ridge would not achieve the same results that Hanfor experiences even if they spent the additional funds for the increased testing frequency.

A failure of an alarm device does not prevent the automatic sprinkler system from functioning. It only prevents the alarm from being transmitted. To fail in the overall goal of prevention of unacceptable fire damage, we must first experience an ignition; the ignition must grow into a fire of sufficient magnitude to cause damage; the sprinkler system must fail to extinguish the fire, and the alarm device must fail to transmit the alarm to the site fire department so that they may respond and manually extinguish the fire. Failure of the alarm device itself is independent of the ability of the automatic sprinkler system to extinguish the fire, although there are issues of notification of occupants to effect evacuation of the facility if the alarm device fails and potential criticality and environmental concerns.